s18: EXP LOG (SLTN v367)
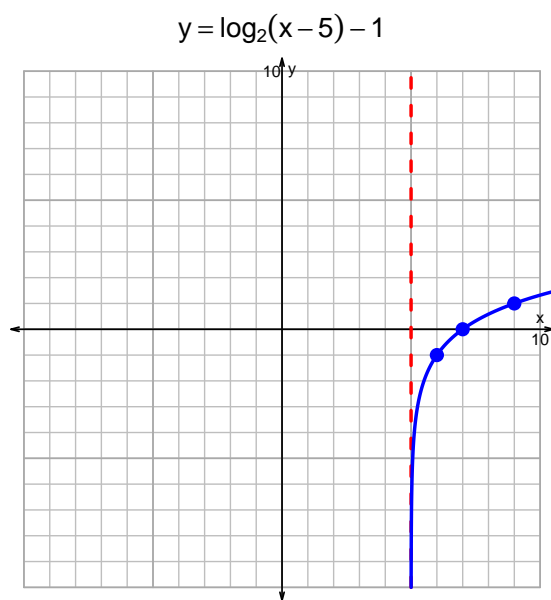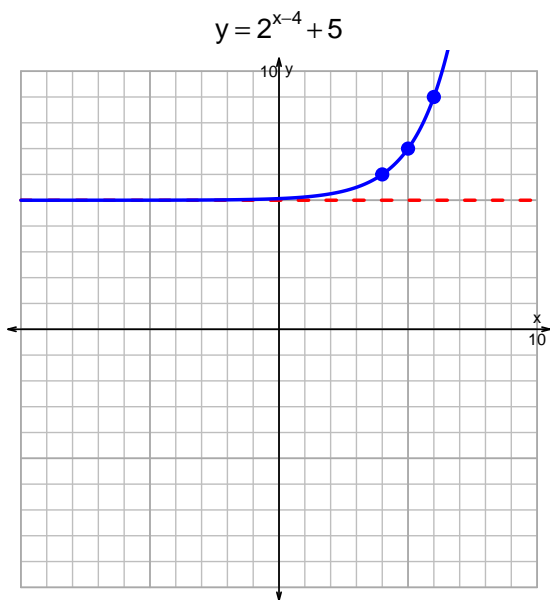
1. (10 pts) Graph $y = 2^{x-4} + 5$ and $y = \log_2(x - 5) - 1$ on the grids below. Also, draw any asymptotes with dashed lines.

$y = 2^{x-4} + 5$

$y = \log_2(x - 5) - 1$

Somewhat useful hint: $2^3 = 8$, and thus $\log_2(8) = 3$.

2. (10 pts) Write (but do not evaluate) the solution to the equation below by writing a logarithmic expression. Please do not do any arithmetic; just move numbers around.

$$-23 = \left(\frac{-7}{4}\right) \cdot 2^{5t/3}$$

Divide both sides by $\frac{-7}{4}$.

$$\frac{23 \cdot 4}{7} = 2^{5t/3}$$

Take log, base 2, of both sides.

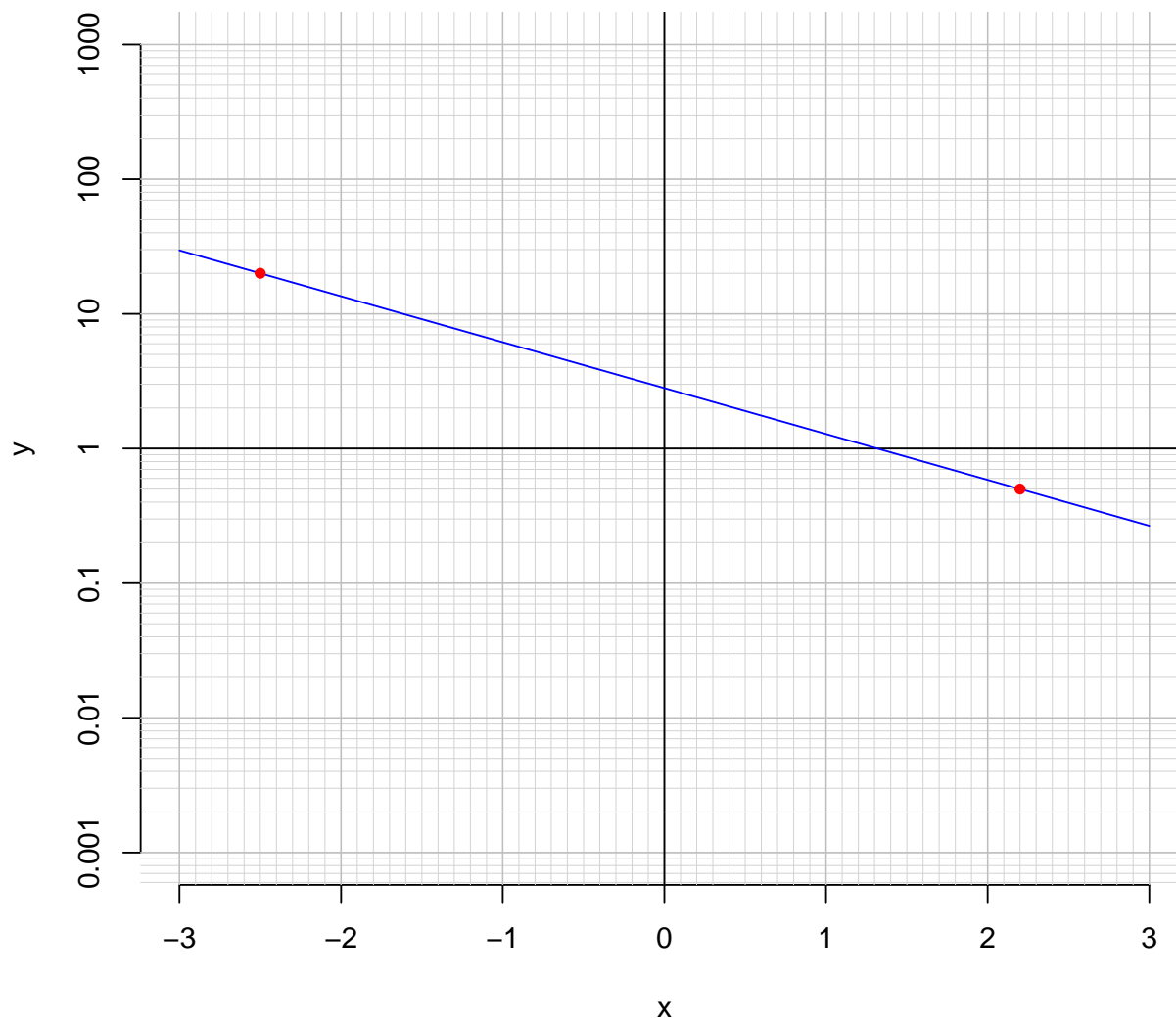$$\log_2\left(\frac{23 \cdot 4}{7}\right) = \frac{5t}{3}$$

Divide both sides by $\frac{5}{3}$.

$$\frac{3}{5} \cdot \log_2\left(\frac{23 \cdot 4}{7}\right) = t$$

Switch sides.

$$t = \frac{3}{5} \cdot \log_2\left(\frac{23 \cdot 4}{7}\right)$$

3. (10 pts) An exponential function $f(x) = 2.81 \cdot e^{-0.785x}$ is graphed below on a semi-log plot.

a. Using the plot above, evaluate $f(2.2)$.

$$f(2.2) = 0.5$$

b. The inverse function is logarithmic.

$$f^{-1}(x) = \frac{-1}{0.785} \cdot \ln\left(\frac{x}{2.81}\right)$$

Using the plot above, evaluate $f^{-1}(20)$.

$$f^{-1}(20) = -2.5$$